Appendix

F

BIGHORN NATIONAL FOREST

Final Environmental Impact Statement
for the
Revised Land and Resource Management Plan

Biological Assessment

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Biological Assessment

Introduction/Abstract

This Biological Assessment is prepared in compliance with Section 7 (Interagency Cooperation) of the Endangered Species Act and 50 CFR 402.12 Biological Assessments. It addresses the potential effects from implementing any of the alternatives proposed in the Bighorn National Forest's Final Environmental Impact Statement (FEIS) for the Revised Land and Resource Management Plan. This document addresses the programmatic implementation of the plan, rather than specific habitat altering projects. Alternative DFEIS has been selected as the preferred alternative from the FEIS, and the Revised Plan is the implementation document that the Forest will adhere to for the next 10-15 years.

A Draft Biological Assessment was sent to the U.S. Fish and Wildlife Service (USFWS) accompanying the DEIS and proposed Revised Plan during the public comment period on the DEIS/plan. Since that time, a substantial change has been made within the Biological Assessment in conjunction with new management direction and an accompanying determination for lynx, and information was added with regards to downstream species potentially affected by the Revised Plan (i.e. pallid sturgeon and Ute's ladies'-tresses).

In summary, regardless of the alternative selected, implementation of the Revised Plan would have the following effects determinations for the species considered in this document:

Table F-1. Summary of Effects Determinations for T&E species Evaluated on the Bighorn National Forest.

Species	Determination
Canada Lynx	May affect, not likely to adversely affect.
Bald Eagle	May affect, not likely to adversely affect.
Gray Wolf	May affect, not likely to adversely affect.
Grizzly Bear	No effect.
Pallid Sturgeon	No effect.
Ute's Ladies'-tresses	No effect.

Legal and Administrative Framework

Federally listed threatened and endangered species are those plant and animal species formally listed by the USFWS under authority of the Endangered Species Act of 1973, as amended. Four categories of species need evaluated with regard to Land and Resource Management Plan revisions, including endangered, threatened, proposed, and candidate species. An endangered species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. A proposed species is defined as one in which information now in possession of the USFWS indicates that proposing to list the species as endangered or threatened is possibly appropriate, but conclusive data on biological vulnerability and threats are not currently available to support proposed rules. A candidate species is defined as a species for which sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list but issuance of the proposed rule is precluded due to higher priorities.

The USFWS, in a letter dated March 23, 2004 to the Forest, considers two federally listed species that need to be analyzed during the revision process. These are the bald eagle (threatened), and the Canada lynx (threatened). Previously, additional species were also considered as potentially occurring on the Forest. The Bighorn NF recently searched for potential habitat and occurrences of both the mountain plover (previously proposed) and the Ute's ladies'-tresses (threatened), finding neither, and the potential species list was modified accordingly. Currently, there are no endangered, candidate or proposed species occurring or potentially occurring on the Bighorn NF. The sage grouse, which has been petitioned for listing but found not warranted, is addressed in the Biological Evaluation for Forest Service sensitive species (See Appendix K).

Databases including the Wyoming Natural Diversity Database (WYNDD) and the Wyoming Game and Fish Department's (WGFD) Wildlife Observation System were searched prior to refining species' lists in conjunction with the USFWS.

Table F-2. Threatened Species identified by U.S. Fish and Wildlife Service on the Bighorn NF.

Listed Species	Status	Expected Occurrence
Canada lynx (*Lynx Canadensis*)	Threatened	Forested areas as migrant or resident.
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	Cottonwood riparian areas, mountain lakes and streams as a migrant.

There is also a need to consider additional species occurring downstream in the Yellowstone River system. In addition, two other species, the gray wolf and the grizzly bear, are briefly considered in this document.

Prior Consultations

At the programmatic level, prior consultations have occurred with the USFWS regarding the 1985 Forest Plan involving the bald eagle and peregrine falcon, both of which were found to not be affected by plan implementation. Since then, the peregrine falcon has been delisted, and is described in the Biological Evaluation as a sensitive species. In 2000, the Canada lynx was listed as a threatened species. At that time, the Forest mapped potential habitat and began hair-snare surveys for the species. The Forest also prepared a Biological Assessment to address ongoing and recently approved projects in a programmatic fashion. None of the ongoing or recently approved activities were found to adversely affect the lynx, and the USFWS concurred with this determination (USFWS 2000). Since then, several projects including the Swamp Timber Sale, Devils Canyon AMP, Tongue AMP, Woodrock Project, and the Hunt Mt. prescribed burn have been consulted on regarding lynx, and a forest-wide Biological Assessment was also recently prepared for the continued use of powerlines with regards to the bald eagle and lynx. Conservation measures for both of these species that have been referenced in these projects are now a part of the forest-wide standards and guidelines (e.g. lynx standards and guidelines, raptor electrocution, and raptor nest buffers). Monitoring with the USFWS has recently begun to track the cumulative effects to lynx habitat within lynx analysis units. There are no outstanding conservation measures or monitoring prescribed by consultations that have not been followed to date.

Proposed Action and Alternatives

The purpose of the Plan Revision is to update the 1985 plan with needed changes in terms of laws and regulations, as well as updating the desired application of management area prescriptions and forest-wide standards and guidelines. The actions proposed cover the entire 1.1 million acre Bighorn NF in north central Wyoming. The Bighorn NF has some of the least inclusions of private land within its boundary of any National Forest, though private, state, tribal, and federal lands surround the Forest. The lack of private inclusions reduces opportunities for conflicting management emphasis within the boundaries of the Forest. In terms of commodity uses, the Forest is mainly used for recreation purposes, livestock grazing, and timber harvest. In terms of development, the Forest is primarily accessed via Highways 14, 14A, and 16, with approximately 10 lodges providing overnight accomodations and recreation opportunities, approximately 70 campgrounds/ trailheads, 265 summer recreation cabins (private), and two small downill ski areas. Numerous lakes and rivers attract fishermen, big game hunting is a high use in the fall period, and winter activities are primarily snowmobiling and skiing. Wildlife and scenery viewing are also high recreation uses, as well as the use of the Cloud Peak Wilderness area with approximately 80,000 visitor days in a year. All of these uses were quantified in a social survey conducted on the four counties surrounding the Bighorn NF (Jensen and Blevins 2002), and discussions of social and economic values associated with the Forest occur in Chapter 3 of the FEIS.

Timber harvest levels originally began near the 15 mmbf (million board feet) level per year following implementation of the 1985 plan, but have averaged approximately 2-5 mmbf for the past five years. An amendment to adjust the Allowable Sale Quantity (ASQ) of timber harvest was nearly completed in 1994 with an ASQ of approximately 6 mmbf as the preferred alternative, but it was delayed in preference for plan revision and for political reasons. The Regional Forester placed an administrative cap on the Bighorn NF for a harvest level of approximately 5 mmbf per year beginning in 1996.

The FEIS prepared for the plan revision lists six alternatives that were considered. The general themes and descriptions of the six alternatives are described below. Refer to Chapter 2 of the FEIS for further descriptions of the alternatives. Alternatives vary in the application of management area prescriptions, both in terms of location and amount. Forest-wide goals and objectives, standards and guidelines, and management area standards and guidelines, and the monitoring and evaluation plan were not varied by alternative. There was no variation in levels of livestock grazing addressed by any of the alternatives considered in detail as described below.

Alternative A – This is 1985 plan updated with new standards and guidelines, but with the same management area allocations. The true no-action alternative, as described in Chapter 2 of the FEIS, would use the old standards and guidelines. Several areas such as the Piney/Rock Creek area would remain in the Forest's suitable timber base, which have not been harvested in implementation of the 1985 plan due to concerns over economics and road construction.

Alternative B – This is a wildlife and biodiversity emphasis alternative. This alternative contains the most acres of management area 3.5, which is designed to achieve habitat diversity, and yet minimize any new road construction. In addition, 4 wild and scenic rivers would be proposed, and four Research Natural Areas (RNAs – mgmt. prescription 2.2) would be added to the existing two, but no additional wilderness.

Alternative C – This is a roadless and wilderness emphasis alternative. Five new proposed wilderness areas would be designated (managmenet prescription 1.2), along with 4 wild and scenic rivers (management prescriptions 2.4, 3.4 and 4.4). There would be minimal management for habitat diversity other than what would naturally occur. Four new RNAs would be added.

Alternative D$_{DEIS}$ – This alternative would seek to implement current management trends on the Forest. Areas that have not been historically roaded would mostly remain unroaded, and current recreation and other emphasis would largely continue similar to those trends currently being managed for in a defacto sense. Four new RNAs would be added, but no new wilderness or wild and scenic rivers would be designated.

Alternative D$_{FEIS}$ – This alternative was developed as a refinement of Alternative D$_{DEIS}$ based on public comment on the DEIS. Areas that have not been historically roaded would mostly remain unroaded, and current recreation and other emphasis

would largely continue similar to those trends currently managed for in a defacto sense. Two new RNAs would be proposed, one recommended wilderness, and several "roadless" areas (Mgt. category 1) were added in response to public comment that make this alternative different from DDEIS. In addition, other category 5 prescriptions were added (5.4 and 5.5) to recognize prevalent themes of management for recreation and wildlife in addition to forested vegetation management. The MW prescription was also added to reflect management around the Medicine Wheel historic site. While there was little change between the DEIS and FEIS for this alternative in terms of overall allocation of management categories (1-8), there was significant realignment to meet the roadless emphasis, and a change in direction for lynx management with regards to the standards and guidelines (Plan Chapter 1).

Alternative E – This alternative would seek to maximize production of the timber resource commodity. It has the most application of the Category 5 management area prescriptions. Minimal roadless areas would occur. No RNAs would be added, nor any wilderness or wild and scenic rivers.

Other alternatives were considered but not analyzed in detail as described in Chapter 2 of the FEIS.

The activities of timber harvest and its associated road construction were the two main activities varied by alternative with regards to resource uses. The following table shows the level of these outputs by alternative. Management prescriptions in category 5, including 5.11, 5.12, 5.13, 5.4 and 5.5 (but not 5.41) as described in the Revised Plan, delineate where timber harvest would occur (i.e. suitable base). Roads that are constructed in support of timber harvest activities would primarily be temporary roads (i.e. closed and decomissioned after use), with the exception of roads built into the Piney/Rock Creek area in Alternatives A and E, which would likely leave approximately 25 miles of road open to motorized uses. The miles of road listed in the table below would be those of a higher use level where closure would not be anticipated. Roads are typically of greatest concern with regard to overall wildlife habitat integrity (e.g. disturbance from people, influence of non-native plant and animal species, etc.)

Combined, these potential impacts were the main focus of resource risks to habitat as identified in the species viability planning process, which included consideration of large-scale planning documents prepared by The Nature Conservancy, Forest Service, and others. Refer to the project record for species viability planning process, and the biodiversity section of Chapter 3 in the FEIS.

Table F-3. Summary of timber harvest emphasis and effects by alternative.

	Alt A	Alt B	Alt C	Alt DDEIS	Alt DFEIS	Alt E
Suited acres	271,895	124,521	62,093	184,606	182,930	305,535
Total Sale Program (MMBF/yr.)	12.5	7.4	3.6	8.6	10	14.7
Anticipated Road Construction (miles) in next decade	29	20	9	27	27	32

When viewing this table, it should be noted that there are approximately 720,000 acres of forested lands within the Bighorn NF, so Alternative E would allow harvest on a maximum of approximately 41% of the total forested acres. It should also be noted that the total sale program figure for timber harvest is generated from a model, when in reality, budgets determine the annual output. For the Bighorn NF, our average budget associated output has been approximately 4 – 6 mmbf/yr for the past decade.

Anticipated road construction miles are estimated from timber harvest modeling. For most areas, it is assumed that approximately 90% of these road miles would be closed upon project completion. The exception would be any roads constructed into the Piney/Rock Creek areas under Alternatives E and A for harvest purposes, as these roads are presumed to be left open due to the level of durability with which the roads would be constructed. These roads would likely be within the two LAUs for lynx habitat in this area.

There would be no likely increase in urban type development on the Forest (e.g. campgrounds, cabins, lodges, facilities) in the next planning period, as there is a deferred maintenance backlog for caring for existing sites and uses. The possible exception to this would be the development of a small rest area along Highway 16 in the State's right-of way. There would likely be very few miles of additional trails constructed, also due to the maintenance backlog. Of additional risk to species would be the potential in expansion for invasive species, which is largely addressed in the standards and guidelines listed below.

In terms of natural disturbance processes (e.g. fire, insects and disease), those alternatives with the least amount of management category 5 prescriptions would have the greatest opportunity for more widespread occurrences of these types of disturbances affecting the vegetative condition.

The Revised Forest Plan that accompanies this document details the forest-wide goals and objectives, standards and guidelines, management area descriptions and standards and guidelines, and the monitoring and evaluation plan that would be implemented for the preferred alternative as selected from those described above. Desired Future Conditions (DFCs) of the Forest are defined by large watersheds (9 total), and are comprised of the dominant management categories applied to that watershed, combined with existing unique features, and are described in Chapter 3 of the Revised Plan.

Resource Protection Measures

Laws, policy, forest-wide direction, and standards and guidelines that maintain or enhance habitats for threatened and endangered species apply to the Preferred Alternative. Chapters 1 and 2 of the Revised Plan contain the updated resource protection measures, which can also be termed conservation measures for these species and their habitat. A summary of the measures pertinent to threatened and endangered species, other wildlife, and their potential habitat follows:

Forestwide Goals and Objectives

The following goals, objectives, and strategies would provide guidance and help determine allocation of funding on an annual basis. Strategies listed would be the focus items to accomplish over the next planning period (10-15 years). These items also provide measures with which to evaluate the effectiveness of the plan, as described in Chapter 4 (Monitoring and Evaluation) of the Revised Plan.

Goal 1 – Ensure Sustainable Ecosystems

Manage to assure ecosystem health and conservation using a collaborative approach to sustain the Bighorn NF's forests, grasslands, and watersheds.

Objective 1.a: Improve and protect watershed conditions to provide the water quality and quantity and soil productivity necessary to support ecological functions and intended beneficial water uses.

Strategies 1 – 6 provide implementation emphasis to improve watershed health.

Objective 1.b: Provide ecological conditions and habitat to sustain viable populations of native and desired non-native species including T&E, Sensitive, MIS and other emphasis species listed in Appendix C.

Strategies 1 – 11 provide implementation emphasis for species management.

Strategy 9 provides implementation emphasis specifically for lynx.

Objective 1.c: Increase the amount of forests and rangelands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

Strategies 1 – 7 provide implementation emphasis for vegetation management.

Forestwide Standards and Guidelines

The following standards and guidelines provide "sideboards" with which to plan and implement projects under the Forest Plan. Standards are more authoritative than guidelines, and would require a Forest Plan amendment to deviate from them in a project. Guidelines provide guidance, but may be deviated from in rare circumstances if properly disclosed with sound rationale in the appropriate project NEPA document (e.g. EA or EIS).

Table F-4. Resource Protection Standards and Guidelines for the Bighorn National Forest.

Section	Emphasis	Standards and Guidelines
Physical	Soil, Water, Riparian	Standards 1 - 2; Guidelines 1 – 4
Biological	Biodiversity	Standard 1; Guidelines 1 – 10
	Fisheries	Standards 1 - 2; Guidelines 1 – 3
	Rangeland Vegetation	Standards 1 – 5; Guidelines 1 – 11
	Rangeland Improvement and Maintenance	Standard 3; Guidelines 2, 4, 7, 8
	Silviculture	Guidelines 2, 3
	Threatened, Endangered, and Sensitive Species	Standards 1 – 3 Lynx standards and guidelines;
	Wildlife	Guidelines 1 – 14
	Fire	Guidelines 1 – 5
	Insects and Disease	Guidelines 1 – 3
	Non-native Invasive Species	Standards 1 – 5; Guidelines 1 – 4
Social	Recreation – Dispersed	Standards 1 – 2; Guideline 4
Administrative	Infrastructure – Travelways	Standards 1 – 2; Guidelines 2, 4, 8
	Real Estate – Land Adjustments	Standard 1; Guideline 2
	Transportation and Utility Corridors	Standards 1, 3; Guideline 4

In addition to the above listed measures, one of the positive differences for habitat purposes with the Revised Plan will be the cancellation of the "C" travel management areas, where off-road vehicles were allowed in several places on the Forest to ride off of roads. This measure (restricting vehicles to roads) would now be common to all of the alternatives.

The goals, objectives, standards, guidelines, and monitoring portions of the Revised Plan are largely new focal elements that did not occur with specificity or with the details of species conservation in the 1985 plan. These measures, combined with more realistic planning in terms of timber harvest and road construction levels, and the continued focus on improving livestock management on the Forest will provide improved habitat conditions for the ensuing planning period.

Elk security habitat was the focus of wildlife related analysis, as it was used as a surrogate for maintaining sufficient canopy cover and lower road density conditions. Refer to the wildlife chapter in the FEIS (Chapter 3) for an explanation.

Threatened/Endangered Species with Habitat on the Bighorn National Forest

This section focuses on the status, distribution, habitat, and vulnerability of bald eagles and Canada lynx and on the predicted effects the alternatives will have on habitat for these species.

Bald Eagle (*Haliaeetus leucocephalus)*

Status and distribution of the species Outside Alaska, the bald eagle is listed as "threatened" by the USFWS. Historically bald eagles nested throughout North America, but the population greatly decreased during the 1900s due to shooting, habitat alteration, pesticide use, and disturbance at nest sites. By the 1970s, the species was extirpated from much of its former breeding habitat and greatly reduced in the remaining occupied areas in the lower 48 states.

The species was originally listed in 1978. In 1995, populations had recovered across the country and those considered "endangered" were downlisted to "threatened" status. In 1999, most recovery goals had been met and the population continued to increase, leading the USFWS to propose that the species be removed from the Endangered Species list. Breeding populations now exist in all Canadian provinces, all but two states in the United States, and in Mexico. A decision on delisting has not occurred.

Status and distribution on the Bighorn National Forest Bald eagles are not currently nor historically known to winter roost or nest on the Forest. Winter roosting occurs adjacent to the Forest in cottonwood dominated riparian areas, such as the Tongue River and Tensleep Canyon. However, day-time foraging use of perches on the fringes of the Forest have been observed in the fall and winter, and other casual observations of migrating eagles are known, particularly during the spring and fall migration periods at unfrozen high elevation lakes. There is no identified "critical habitat" on the Forest. Assuming numbers continue to increase in the future, there may be a potential for some roosting or nesting occurrences on the Forest. As populations continue to increase, there would also be a possible delisting of the species.

Habitat Bald eagles are seldom seen far away from water, seacoasts, lakes or rivers. Eagles require large diameter trees for roosting, perching, and nesting. Breeding requires a readily available food source of moderate to large fish, large diameter trees, and minimal disturbance from humans. Carrion use is an important food source for eagles during the winter months. The nesting season typically begins in April, and lasts through July. Sexual maturity is usually reached at 5 years of age. Bald eagles lay one to four eggs.

Threats from human activity Bald eagles are susceptible to disturbance at nest sites, though individual pairs vary greatly in their tolerance of human activity. New sources of disturbance or increased disturbance at existing nesting sites are the primary concerns: eagles that nest repeatedly at sites of high existing recreation are assumed to tolerate

disturbance.

Vulnerability to Forest Service management activities Potential disturbance factors include recreation activities, timber harvest, prescribed fire, and powerline risks. There have not been any known disruptions to eagles from these activities on the Forest. Both raptor nest and raptor electrocution conservation measures have been included in the Revised Plan to provide managers means of protecting eagles and their habitat, should they nest or roost on the Forest in the future.

Environmental Consequences There are no significant differences among alternatives that would affect habitat or prey base for eagles, as forest-wide standards and guidelines would offer protection needed. Additional logging and roading in Alternatives A and E would not likely have an effect on the eagle, as this has not been shown to be of detriment, and riparian buffers of 100' around streams and lakes from this type of activity would preclude primary habitat disturbance. Extra riparian management would occur out to 300' from perennial streams to help provide habitat for eagles, should they occur in riparian areas. Continued use of powerlines would likely be the most significant mortality risk for the species, though there have been no known occurrences of mortality associated with powerlines for bald eagles. There have been no known disturbances from recreational activities to bald eagles, primarily due to the eagle's limited use of the Forest as foraging habitat.

In terms of cumulative effects, the Forest and the adjoining mile or two surrounding it were generally considered as an analysis area for most effects. With regard to future state and private activities, there are few on the Forest. As mentioned previously, a rest area may be constructed along Highway 16, which should have no effect on the bald eagle. There would likely be widening of Highway 14 on the portion of state land (right of way) from Cutler Hill to Steamboat rock above Dayton over the next several years. Widening of Highway 16 is completed west of Buffalo. These are not anticipated to be of an effect to the eagle. Future private developments may include the subdivision of private ranches adjoining the Forest, with typical urban development accompanying the subdividing. These developments would provide increased opportunities for invasive species, and could also displace wildlife. Most of the eagle's roosting habitat is already managed in ranching private holdings and have not been shown to be of detriment to habitat use in these areas. There are no likely past modifications or development of the Forest that have rendered habitat unsuitable for eagles. Rather, the creation of additional reservoirs for municipal water sources on the Forest may have created additional habitat for eagles, should they begin nesting on the Forest. There are no likely developments on the Forest or immediately adjacent to it in terms of oil and gas developments. In summary, the value of the Forest as habitat would likely increase in the future, assuming development escalates in adjoining lands.

Determination Possible disturbance of foraging birds during migratory use could occur under all alternatives, most likely due to recreation uses. Continued operation of powerlines on the Forest could also pose a mortality risk for eagles. These plan alternatives **may affect, but are <u>not likely to adversely affect</u>** the bald eagle.

Lynx (*Lynx Canadensis)*

Status and distribution of species In the lower 48 states, lynx are still thought to occur in higher numbers only in Washington, Montana, and Maine, with lower numbers in Idaho, Wyoming and a few of the Great Lake States. The status in the other western states including Idaho and Utah is unknown but considered very low, and they are considered extirpated from Oregon. Extensive reintroduction efforts have occurred in Colorado.

Status and distribution on the Bighorn National Forest Lynx historically occurred on the Forest (Ruggiero et al 1994), though whether or not these past observations indicated a resident, self-sustaining population is unknown. Theories have been generated that expansion into more fringe habitats, such as the Bighorn, may have occurred following population highs in other areas. Two recent sightings of lynx have occurred in 2002/2003, though these were unconfirmed with track measurements or other methods. Hair-snare surveys that were conducted for three years from 2000 – 2002 failed to detect any lynx (Malloy 2000 – 2003) on the north end of the Forest in what was estimated to be the most likely potential habitat due to the amount of spruce-fir and snowshoe hare populations. Lynx have been confirmed as occurring and breeding in the Greater Yellowstone Ecosystem, and the Bighorn NF is within a reasonable travel distance from this area for lynx, in terms of future potential occupation.

The new Conservation Agreement (USDA Forest Service 2005) with the USFWS states that lynx would only be managed for in occupied habitat. While the definition of "occupied" was being finalized prior to publication of this document, based on draft criteria known, the Bighorn NF would not be considered as "occupied". Another decision that may affect this is the "critical habitat" ruling that the USFWS is expected to make in 2005/2006, which would delineate this type of habitat in the Lower 48, and may or may not include the Bighorn.

Habitat Lynx are temperate forest dwelling carnivores. They are mostly dependent upon snowshoe hare for prey, but also prey regularly on red squirrels when hares are not abundant. Mid-successional stages of forested communities may serve to promote travel between early and late-successional habitats. Early successional forest stands, following fire or management activities, may promote higher hare densities than intermediate or mature forest stands, but the effect is considered transient. Lynx denning habitat is typically under a forested canopy where an abundance of coarse woody debris occurs (Ruediger et al 2000; Ruggiero et al 1999), which may favor late-successional stands on the Bighorn NF.

The Forest is not known for high prey levels of snowshoe hare as compared to more northern latitudes such as in Idaho, Montana, or Canada (Beauvais pers. comm. 2001; Beauvais 1997). Foraging habitat includes willow carrs and both young and older forests that provide understory conditions for snowshoe hares. Red squirrel habitat is typically optimal in mature conifer forests where coarse woody debris is maximized.

Lynx are adapted to deep snow conditions for a competitive advantage on prey sources. The Bighorns do not maintain a deep snow base below 10,000' (treeline), where an

average snowpack is 2-3' during the months of January – March, and less outside of those months, indicating marginal habitat for lynx on the Forest.

Habitat was mapped on the Forest in 2000 in conjunction with the Wyoming Game and Fish Department (WGFD) and the USFWS. Six Lynx Analysis Units (LAUs) were identified. Potential habitat was considered to be coniferous forests above 7,000' to allow for snowpack. The analysis units were combinations of watersheds to approximate the size of lynx home ranges, and were focused on the northern 2/3 of the Forest where the majority of spruce-fir occurs, which was deemed to be the most suitable habitat for hares and lynx. In 2000 during consultation with the USFWS for the Forest-wide BA, the Rocky Mountain Resource Information System (RIS) database was used in conjunction with GIS data to estimate foraging, denning, and unsuitable habitat amounts. There were no units found to be below the suitable thresholds for denning or combined lynx habitat as identified in the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al 2000). There have been no field verifications of lynx denning habitat to date.

With an aerial-photo based, updated vegetation database (Common Vegetation Unit) and GIS capabilities during plan revision, potential habitat and denning habitat were remapped within the same LAUs and found to be similar to the amounts derived from the RIS based estimates. The recent project consultations mentioned previously (e.g. Swamp and Woodrock timber sales) have not been adjusted within the LAUs as the projects have not been implemented yet. However past wildfires and other modifications in vegetation since the original aerial photo interpretation in 1992 have been updated to 2002 in the database to provide a realistic and more accurate picture of the vegetation on the Forest. Refer to the attached table and map in this document for a description of the mapping criteria, current habitat amounts, and thresholds as applicable to the LCAS. There are no LAUs that are below habitat thresholds as defined in the LCAS, nor anticipated to be as a result of recent disturbances.

It is anticipated that over the next 10 years, old growth habitat will be field inventoried on several of the geographic areas of the Forest, which will provide a suitable surrogate for confirming denning habitat. It is acknowledged that denning habitat (coarse woody debris under a forested canopy) can occur in areas other than old growth, and thus it is not likely a current limiting factor of habitat. Updates to the CVU vegetation database (and its likely successor – R2VEG) would continue in response to fires, timber harvest, and other vegetation manipulations to provide accurate cumulative estimates of lynx habitat potential on the Forest.

What may be a limiting factor for habitat is the lack of younger structural stages that can contribute to higher densities of hares, particularly in spruce-fir cover types. Currently, there is less than 5% of this type of habitat in any of the LAUs.

There is not currently thought to be any lack of connective corridors or *linkage habitat* on the Forest, due to the small highways (low traffic volume and narrow width on Highways 14 and 16) and naturally forested conditions that persist throughout most of the Forest connecting the LAUs. Key linkage routes to potential habitat in the Greater Yellowstone Ecosystem have been identified, and include the Pryor Mountains to the northwest of the

Forest, and the Owl Creek mountains to the southwest of the Forest. There are no highways or man-induced barriers that are likely a significant barrier along these routes. Rather, the drier, shrub type of habitat itself may be more of a barrier, though this was obviously crossed in the past. Lynx have also been sighted out in the sagebrush habitats surrounding the Forest within the past several decades, presumably in a dispersal mode.

In terms of snow compaction, the Bighorn NF has approximately 110 miles of groomed or designated snowmobile trails within lynx habitat, and 342 miles forest-wide, all on existing roads and trails. There are 14 miles of groomed cross-country ski trails in lynx habitat, with 35 miles total forest-wide. The Antelope Butte ski area (several hundred acres) also occurs within lynx habitat on the Forest, though it is very small compared to larger developments in CO and elsewhere in the Northern Rockies. There are several outfitter-guide operations that provide snowmobiling, dogsledding, x-c skiing, or snowshoeing that also compact snow, though at reduced levels as compared to other areas in the Northern Rockies. There are no designated snow play areas on the Bighorn, though large meadows at high elevations outside of the wilderness are often well used by snowmobiles. Should this potential resource risk show increased importance through current research efforts in Montana and other sites, the Forest may need to examine this more closely. The Forest has noted some increase in snowmobiling activity since the further restrictions in Yellowstone National Park have taken effect.

Threats, limiting factors, and vulnerabilities Lynx have a high reproductive potential, as evidenced by their rapid recovery from population crashes in the far northern part of their range, once prey is abundant. However, in the absence of abundant prey, survival of young can be very low. Prey appears to be a limiting factor in reproductive success (Ruggiero et al 1994).

Grazing of livestock and increases in elk populations can create competition for forage with lynx prey, especially hares. Competition with other predators (especially coyotes) may be increased at high elevation in winter by compaction of snow by human activities, though this is conjectural. Coyote numbers have probably increased with elimination of the gray wolf from the Forest, another compounding effect. As indicated below, wolves are anticipated to increase on the Forest, though with less certainty that a pack would become established due to predation concerns on livestock.

Lynx may be killed by vehicular traffic, other predators (like mountain lions or wolves), shooting, and as non-target species in predator control and commercial fur trapping. Wyoming does not permit the harvest of lynx from fur trapping, nor have there been any takings from predator trapping associated with livestock management in the Bighorns. Effects of loss of connectivity include restricted gene flow and increased mortality risks to animals moving between patches in some areas of its range. Trapping may have been a factor in the initial decline of lynx in the Northern Rockies.

Vulnerability to Forest Service management activities Actions that may affect lynx populations and habitat include timber management, fire management, recreation, livestock grazing, utility corridors, and residential, commercial and agricultural developments, such

as housing, ski areas and large resorts. These actions may affect one or more of the primary habitat needs of the species (Ruediger et al 2000).

- Loss of habitat, including denning, dispersal (connectivity), and foraging (mainly winter habitat for the snowshoe hare).
- Loss of competitive advantage over other predators (like bobcats and coyotes) in deep snow resulting from snow compaction by snowmobiles, other vehicles, skiers, and plowing of roads (for example to provide access to private land or for winter logging).
- Disturbance at certain times of the year so that lynx use of habitat may be limited, especially at and near denning habitat. In other settings, lynx seem to be little disturbed by human activity.

Thinning of young stands of lodgepole and spruce–fir to enhance growth for timber production temporarily reduces one of the winter foraging habitats of the lynx's primary prey, the snowshoe hare. However, considerable debate has accompanied this issue as the resulting dog-hair stands of lodgepole that result without thinning provide little habitat for hares or squirrels, and thinning may promote canopies near the snow and resulting larger mature trees more readily than un-thinned stands (Shaw 2001). Research is continuing on this subject in the Rockies.

The Northern Rockies Lynx Amendment (DEIS released January of 2004) provided the framework for the goals, objectives, standards and guidelines with this plan revision. The Bighorn considered modifying this direction further to pursue allowing pre-commercial thinning within dry lodgepole pine stands to promote red squirrel habitat, since these stands did not provide good snowshoe hare habitat, but the Forest dropped this from further consideration. Other Forests have removed dry lodgepole from suitable lynx habitat, however the Bighorn NF had no compelling need at this time to revisit the mapping criteria previously developed. As lodgepole in general still contributes to potential lynx habitat as it is intermingled with moister habitat types, the Forest chose not to remap its habitat classification.

With the release of the new Conservation Agreement, the Forest has opted to retain the lynx management direction (goals, objectives, strategies, and guidelines) within the Revised Plan, with the caveat that the measures are invoked only once habitat is known to be occupied. While this creates some potential that habitat not managed for lynx now could be reduced to an unsuitable condition for lynx should they occur on the Forest again, this potential negative management effect is not thought to have much likelihood of rending the Forest habitat unsuitable or remove it from potential habitat for the species.

Changes from HRV in factors that may affect the species Some clear-cut harvested sites have lost large downed wood (coarse woody debris) used for denning and for resting. Young stands have been thinned to a wider-spaced, more even distribution of trees than would be typical in a stand created by a fire. However, harvesting activities on the Bighorn have taken place on less than 20% of the forested acres, and less than 4% of the forested acres have been harvested by clear-cut methods, indicating a small level of

significance from these effects (Regan et al 2003).

Winter habitat has been altered by the compaction of snow by recreation uses, providing travelways for other predators that could compete with the lynx for prey. The Bighorn recently took part in a proactive study through Utah State University that showed high densities of coyotes along snow-packed routes in lynx habitat (Bunnell 2003). The levels of coyote track densities on the Bighorn are similar to those recorded in Utah and Idaho in other study areas, with similar levels of recreation use.

Another issue is the potential for lynx and bobcats to hybridize. As acknowledged by the USFWS (2003), this effect may occur, and the Bighorn has known populations of bobcats that may persist more readily due to a lack of deep snows more typical for lynx habitat. This may also have effects on the overall genetic and species assumptions made for the lynx.

Environmental Consequences For the following effects analysis, it will be beneficial to refer to the comparison of alternatives section presented in Chapter 2 of the FEIS. In addition, this analysis tiers to any analysis as described in the Northern Rockies Lynx Amendment process, most recently analyzed in the January 2004 DEIS. Since the new Conservation Agreement (USDA Forest Service 2005) has been signed with the USFWS, these effects will also take into consideration the difference of any potential habitat changes that could occur in the absence of lynx, as habitat would not be managed for the species until it becomes occupied.

Regardless of alternative, there would likely continue to be an increased level of *recreation use* on the Forest. This type of use can displace wildlife, depending on the amount and location. There remain large tracts of land on the Forest that have low road densities, as per the 2005 roadless inventory conducted for the FEIS. These areas, combined with the Cloud Peak Wilderness Area, comprise approximately 54% of the Bighorn NF. Future implementation and uncertainty surrounding the Roadless Rule may dominate or over-rule any management set forth by the Revised Plan. Refer to the summary of alternatives, as described in Chapter 2 of the FEIS for more information on this subject, and how the preferred alternative allows for motorized vs. non-motorized recreation and roadless management. Alternatives differed in how they addressed both non-motorized and motorized recreation potential, as well as how wilderness or roadless areas were designated.

With regard to any additional snow-compacting activities conducted on the Forest, there would be minimal potential for this to occur, regardless of alternative. The State Trails program has indicated that they have no plans to request additional groomed trails, nor to designate any play areas for snowmobiles. There have been very few outfitter/guide activities requesting any kind of an increase in either motorized or non-motorized recreation in the winter since 2000, when a "moratorium" was placed on allowing additional increases in these uses in compliance with the LCAS. Should the Forest receive additional requests for these types of activities in the near future, they would likely be allowed due to the unoccupied habitat condition that the Forest is currently in, to comply

with the new Revised Plan direction. However, the Forest anticipates minimal requests, and therefore minimal impact, if any, to potential habitat should lynx not be observed during the next planning period.

Livestock management would continue to be improved with possible reductions in some allotments where standards and guidelines for forage utilization cannot be met under existing stocking rates or grazing systems. Riparian areas, shrublands, and meadows most affected by this resource use would be anticipated to slowly improve, regardless of alternative. There was no difference among alternatives with regards to management of this resource use. A cumulative effect that has potential with this use is the predator control activities undertaken by the USDA Wildlife Services. No mortality of lynx has even been recorded on the Bighorn associated with this type of activity, and recent improvements in trapping methods should serve to prevent mortality, should lynx occur on the Forest. The USDA Wildlife Services is responsible for consulting with the USFWS on these activities. In general, with the overall reduction of sheep grazing on the Forest, predator control activities have also been reduced, and this trend may continue largely in response to economic conditions in the industry.

Prescribed fires and wildfire would continue to alter habitat on the Forest, though considered natural events. Wildfire and *insects and disease* would continue to be the primary influences on patterns or structural stages of forested vegetation on the Forest, regardless of alternative. Where more active management is pursued through insect and disease treatment and active logging, such as in Alternatives A and E, there may be less potential for these types of natural disturbances, though drought and other factors would continue to dominate the pattern and occurrence of this. It is anticipated that a combined total of 10,000 acres may burn in the next planning period, with insects and disease a contributing additional acreage of change, though all unknown.

Timber harvests would also continue, mimicking natural disturbances in many aspects in lodgepole pine through clearcuts. Group and individual tree selection would be the primary silvicultural treatments in spruce-fir stands. Alternatives A and E would have higher levels of commercial harvest and its associated road building as compared to the current output. Alternative B would be similar to the level currently occurring and the level prescribed by the ASQ amendment that was delayed in 1994, and Alternative DDEIS and DFEIS would be slightly higher. Alternative C would have levels lower than what is currently occurring. LCAS standards and guidelines (e.g. amount suitable versus potential habitat in LAUs, and denning habitat requirements) were included in the constraints applied to the timber harvest modeling process. Therefore, any of the plan alternatives still provide compliance with the habitat standards in the LCAS. The risk associated with the increased timber production in Alternatives E and A as compared to current levels would be the increased road network that could lead to exacerbating the challenge of minimizing competition for prey in winter. Areas that were roaded may result in the additional use of these areas by snowmobiles, allowing competing predators a chance to access additional habitat. This would be most evident in the Piney and Rock Creek drainages in these two alternatives, which have currently the most undeveloped potential lynx habitat on the

Forest. However, this factor is also under research as the relationship between roads and prey competition is not fully understood. There are not currently any known limitations in either red squirrel or snowshoe hare populations or habitat conditions on the Forest that would render potential habitat for lynx unsuitable.

Thinning was estimated to have previously occurred on approximately 1,000 acres per year in lynx habitat. If lynx occur, this action would be delayed to meet the LCAS/Northern Rockies Amendment standards. Mean snow-depths are approximately 2-3' on the Bighorn, which may not delay this thinning as much as other National Forests with deeper average snowpack. Thinning is delayed until crowns are above this average snowpack point (typically 20-30 years on the Bighorn). However, in the absence of any known lynx (unoccupied habitat), the Forest may conduct thinning, primarily in dry site lodgepole pine, in the next planning period without waiting for this stage of crown development to occur. This could result in the change of up to 10,000 acres in the next planning period, should lynx not be observed on the Forest. This level of thinning would not likely have a measurable impact on lynx habitat given the forest-wide availability and "unmanaged" condition of most of the habitat, and the lower habitat value of the dry lodgepole pine sites (less prey). Only approximately 182,000 acres are considered "suitable" for timber production (including thinning activities) under Alternative D-FEIS, out of 700,000 total forested acres.

The Healthy Forests Initiative is not anticipated to increase current levels or demands for harvesting or thinning on the Bighorn, as the Forest has very few areas with potential urban interface conditions, and other Forests within the Region are anticipated to get the bulk of additional funding and emphasis to meet this initiative.

Overall, forested vegetation would continue to be dominated by mature stand constructions. Young seral conditions may continue to be under-represented at a forest-wide scale. The current dominance of pole sized trees in some areas of the Forest would continue, as these conditions were achieved as a result of wildfires in the late 1800's.

There would not likely be any proposed expansion in *ski areas or highways* within lynx habitat beyond those already approved. Similarly, there would be no expansion in other urban type developments on the Forest (e.g. campgrounds, cabins, lodges).

Invasive species would likely continue to expand, providing some opportunity for lost habitat. However, the expansion rate on the Forest to date has been minimal in comparison to surrounding landscapes, likely due to the higher moisture regime and shorter growing season on the Forest. Where increased road networks occur, there may be greater risk for expansion of noxious weeds.

In terms of ***cumulative effects***, the Forest and the adjoining mile or two surrounding it were considered as an analysis area for effects. With regard to future state and private activities, there are few on the Forest. As mentioned previously, a rest area may be constructed along Highway 16, which should have minimal effect on potential habitat for lynx, as it is outside the identified LAUs. There would likely be widening of Highway 14 on the portion of State land (right of way) from Cutler Hill to Steamboat rock above

Dayton over the next several years, which is outside of any LAUs as it is below the 7,000' potential habitat elevation line. Widening of Highway 16 is completed west of Buffalo. These are anticipated to be of minimal effect to the lynx, as these widenings still maintain a two-lane highway, and as such should not alter any kind of "linkage route" habitat for lynx. Increases in traffic volume would likely continue in response to trends in tourism and population demographics, particularly outside of the immediate communities surrounding the Bighorns. Current traffic use of the highways crossing the Bighorns is largely seasonal (summer months) and is almost entirely diurnal, and is not currently estimated to be a significant potential for mortality to any carnivores crossing them.

Future private developments may include the subdivision of private ranches adjoining the Forest, with typical urban development accompanying the subdividing. These developments would provide increased opportunities for invasive species, and could also displace wildlife. There are no likely developments on the Forest or immediately adjacent to it in terms of oil and gas developments. While some winter recreation activities may increase, there would be no expansion in groomed or designated snowmobile trail networks as the State has indicated that there is sufficient density of this use.

Past effects from timber harvest and livestock grazing were summarized above, and other cumulative effects are listed in the introduction to Chapter 3 within the FEIS.

In *summary*, the value of the Forest as habitat would likely increase in the future, assuming development escalates in adjoining lands. The most significant past activities that have altered the Forest cumulatively have been the development of road networks for timber harvesting purposes that have created a loss of habitat through surface modification and have possibly allowed increased competition for prey during the winter. The impacts from past timber harvesting is considered to be minimal in terms of vegetative change, as clearcuts may mimic fire disturbances, and other harvest regimes are slow to change forest canopy structures. Past and future timber harvests may reduce the amount of coarse woody debris on harvested lands in the long term, as indicated by research (Tinker and Knight 2000 and 2001). However, due to the limited extent of logging practices on the Forest, this effect should not be widespread, and large areas with sufficient or naturally potential CWD would remain.

Future projects implemented under the Plan would use the vegetation database for tracking of cumulative effects to vegetation/habitat conditions. While consultation may not occur for individual projects unless lynx are known to occur, vegetation databases tracking the amounts of suitable/unsuitable habitat by LAU would continue to be updated. Should the "thresholds" established in the LCAS (or current management direction) be exceeded, consultation would occur.

Effects Determination Due to the difference in timing of completion of the Bighorn NF's Revised Plan and the completion of the Northern Rockies Lynx Amendment, the Bighorn NF, in conferencing with the USFWS (on the Bighorn's DEIS), has decided to use the LCAS conservation measures as described by Alternative B in the 2004 Northern Rockies Amendment DEIS. These standards and guidelines were incorporated into the Bighorn's

Revised Plan. Once the Northern Rockies Amendment is complete, the new management direction developed through that process will be added to the Bighorn NF Revised Plan through amendment. However, use of any of these conservation measures would be contingent on the Bighorn NF becoming occupied by lynx, as per the new Conservation Agreement (USDA Forest Service 2005). Should habitat become occupied, use of this direction would continue for the remainder of the planning period. Consultation with the USFWS on projects implemented under the plan would not occur unless the habitat became occupied, although the effects to lynx habitat could still be cumulatively tracked through the vegetation database and the LAUs. Similarly, should there be a decision from the USFWS regarding critical habitat that would affect the Bighorn, an additional amendment may occur. The Lynx Biology Team that assembled the LCAS recognized the isolated condition and lack of potential habitat on the Forest as being of low overall value to lynx in Wyoming. These latter two future processes or amendments are also clarified in the strategy added for lynx management in Chapter 1 of the Revised Plan (Objective 1b, Strategy 9).

With the incorporation of the conservation measures prescribed by the LCAS and/or the Northern Rockies Lynx Amendment into the Bighorn's Revised Plan, and with the standard operating procedure of consulting with the USFWS on proposed projects to ensure compliance with these measures, effects were deemed to have minimal potential of adversely affecting the lynx should they occur. Potential for habitat degradation to occur in the absence of lynx (due to the new Conservation Agreement) are minimal, as described above. This is due to the few suited timber harvest acres overall on the Forest, and the provision for large "roadless" areas to continue, under both scenarios (occupied or unoccupied habitat). All predicted timber harvest modeling included the provision for lynx habitat. However, the Forest can not assume that no effects would occur, as changes to habitat are anticipated, and an individual lynx, should it occur on the Forest, could have a very remote chance of being harmed during management activities (e.g. prescribed burn or timber sale), or through cumulative effects such as highway mortality on the Forest. Therefore, the determination for this Revised Plan with regards to the lynx is that implementation of it **may affect, but is not likely to adversely affect** the lynx.

The Northern Rockies Lynx Amendment may result in a *Likely to Adversely Affect* determination due in part to the preferred alternative not following the LCAS conservation measures completely. This determination would apply to the Bighorn as would be described in the FEIS for that amendment upon its completion for that amendment process. The Bighorn NF views that determination as a function of the scale of that amendment (many states), the potential impacts of the Healthy Forests Initiative, and the need to take a "worst case scenario" approach for all of the lands involved in that decision. As mentioned above, the Bighorn is not anticipated to receive additional funding and emphasis for projects to meet the Healthy Forests initiative due to its remote location and lack of development in and around the Forest. In addition, the Revised Plan is a similar approximation of the current and recent past management scenario on the Forest, which was consulted on in 2000 with the USFWS, and found to *not likely adversely affect* the lynx.

Finally, with regards to **monitoring**, the Forest plans to perform annual updates of its vegetation GIS database (CVU), which is used to track current status of lynx habitat in LAUs with regards to suitable/unsuitable habitat thresholds. In addition, the Forest plans to follow through with verifying or confirming any lynx sightings on the Forest, in conjunction with the WGFD and USFWS as necessary, and will be conducting some winter track monitoring for carnivores, which may also provide potential information on lynx sightings or occurrences. Projects conducted under the Revised Plan would also be monitored to determine if standards and guidelines were effective in projects and if the goals, objectives, and strategies in the Plan were implemented correctly (e.g. coarse woody debris, and old growth guidelines, lynx suitable habitat standards and guidelines, etc.). Refer to Chapter 4 of the Revised Plan to view planned monitoring efforts.

Downstream Yellowstone River Species

The Tongue River, Powder River, and the Bighorn River which comprise the major watersheds on and surrounding the Forest all flow into the Yellowstone River. The species of concern in the Yellowstone system is the Pallid sturgeon, and to some extent, the Ute's ladies-tresses orchid. The Forest could have the potential to influence downstream habitat from management activities conducted on the Forest, and therefore analysis was deemed appropriate for these species. As the Forest does not directly provide habitat for these species, nor are any known to occur immediately adjacent (within 3 miles) of the Forest boundary, less analysis was performed compared to species previously analyzed in this document.

Pallid Sturgeon

Pallid sturgeon (endangered) did not historically inhabit the Bighorn NF. The Bighorn NF is outside any of the pallid sturgeon recovery areas. Pallid sturgeon historically inhabited the lower Yellowstone River (Dryer and Sandvol 1993). The lowhead dam at Intake, Montana restricts upstream movement of pallid sturgeon and defines the upstream limit of all or majority of pallid sturgeon in the Yellowstone River (Bramblet and White 2001; USFWS 2000). The historic range has been drastically reduced due to habitat loss and alteration. Much of the alteration is a result of the Missouri River dams. These dams altered the hydrograph (timing, duration and intensity), temperature regimes (colder in summer, warmer in winter) and reduced turbidity as well as dividing the river into segments. These segments contain isolated populations of pallid sturgeon.

Pallid sturgeon Recovery Area 2 includes the Yellowstone River upstream from its confluence with the Missouri River to the mouth of the Tongue River (Dryer and Sandvol 1993). The recovery plan shows Recovery Area 2 to include habitats upstream of the accepted historical range. The pallid sturgeon is listed as an endangered species and populations are managed under the Endangered Species Act and direction in the pallid sturgeon recovery plan.

In conversations with the USFWS (Jordan USFWS, pers. Comm. 2003 and 2004), issues concerning water depletion and its effect on habitat potential downstream were identified and discussed. The USFWS described that the Tongue and Powder Rivers are highly altered downstream of the Forest, and effects of water depletion activities on the Forest would be minimal, if any. Activities that could alter the hydrograph of the Bighorn, Tongue or Powder Rivers would be of concern to the USFWS. The Forest is not proposing any water depletions (diversions, storage reservoirs, etc.) with this Revised Plan. The potential for water depletion effects caused by site specific activities would be analyzed at the project level. Ongoing water depletions on the Forest of agricultural, muncipal, and other minor uses (e.g. firefighting, livestock watering) have not been deemed to be of significant effect to the habitat for this species further downstream by the USFWS.

Further, the Yellowstone River is covered under the 2000 Biological Opinion for the Missouri River Army Corps of Engineers operations and actions (USFWS 2000). The Opinion is very thorough and does not mention water depletion as a cause for take (death). They list several causes of take and state, "Therefore, incidental take, in the form of harm and harass (i.e., habitat loss and alteration due to operation and maintenance of the Missouri and Kansas Rivers and the BSNP) will result in actual death or injury through loss of reproduction and recruitment." Water depletion is not listed as a source of unavoidable loss (take). If water depletion were significant it would result in habitat loss which would lead to take.

There are plans to reintroduce the pallid sturgeon into the Tongue River drainage downstream from the Forest. A total of 1430 juvenile pallid sturgeon were introduced in Recovery Area 2 between 1998 and 2000 (USFWS 2000). These efforts have temporarily increased population numbers; however, primary concerns relate to loss of reproduction and recruitment from habitat alterations created by the reservoirs and diversions downstream from the Forest . The water quality of streams sampled at the Forest boundary has been shown to be of good water quality prior to impacts occurring on lands adjacent to or downstream of the Forest.

Forest management direction proposed (livestock grazing, vegetation and travel access management, recreation, etc.) in this Revised Plan would not directly, indirectly or add cumulatively to the downstream effects from diversions and dams. No critical habitat occurs on Forest administered lands and any potential effect from forest management activities would be overshadowed by the effects of downstream diversions and dams. The Forest is not proposing any water depletions with this Revised Plan, and water quality and watershed management Best Management Practices have been added to the Revised Plan to protect water quality. Based on information in the recovery plan, 2000 BO and the direction proposed in the Revised Plan, it is determined there would be **no effect** to theses species. Any proposals for water depletions would need site specific analysis and consultation with the USFWS to determine effects and institute conservation measures if necessary.

Ute's Ladies'-tresses

This plant (*Spiranthes diluvialus*) is known to inhabit riparian areas in the intermountain west. The potential for habitat was evaluated on the Forest, in conjunction with surveys conducted to determine its presence in 2002 and 2003 (USDAFS 2002; 2003). This analysis also provided a review of current known habitat descriptions in other areas of the State (Fertig 2000). A negative finding of either habitat or species occurrence on the Forest was made, with which the USFWS concurred (USFWS 2003).

In summary, as the species is not known to occur on the Forest or immediately adjacent to it, there is little to no likelihood of any management activities on the Forest impacting this species or its habitat. Potential reductions in water flow or hydrograph alteration as described for the pallid sturgeon could also be of concern for this species if it were known to downstream locations from the Forest. Based on similar rationale mentioned above for the pallid sturgeon, there would be **no effect** to this species from implementation of the Revised Plan.

Gray Wolf and Grizzly Bear

Both the gray wolf and the grizzly bear historically inhabited the Bighorn NF. They were both extirpated in the early 1900's following European settlement due to predation concerns. The Bighorn NF is currently outside the recovery areas being considered for the grizzly bear, but falls within the recovery area for the wolf (though not specifically targeted with releases). The WGFD has jurisdiction for management of the populations of the species, and has approved a draft wolf management plan (WGFD 2003) and a final grizzly bear management plan (Moody et al 2002). The EIS prepared for the gray wolf reintroduction provides details on this non-essential, experimental population, including the lack of need for specific management direction by National Forests (in terms of standards and guidelines) to accommodate the reintroduction and management for the wolf (59 FR 60252 November 22, 1994).

Wolf Due to the management activities conducted by the USDA Wildlife Services, as approved by the USFWS, control measures taken on wolves in response to depredation on livestock in Wyoming may prevent the establishment of a pack of wolves on the Bighorn. However, this is speculative, and wolves have been sighted in recent years on the Forest, but have also been killed on the Forest in response to depredation of livestock.

There are no habitat management considerations that the Forest was required to consider for this species, as it is a habitat generalist and very adaptive, as provided for in the 1994 EIS for reintroduction by the USFWS. Provisions for elk security habitat may help address some habitat elements by providing forested cover with lower road densities, and big game winter range, another primary habitat, would continue to receive management direction similar to the 1985 plan. People concerned with the management of this species from a predation standpoint, such as on livestock permittees on the Forest, would need to contact the USDA APHIS Wildlife Services agency to seek relief from depredation.

The Forest would not be directly involved in management of this species, nor are there any plans for transplant of this species to the Forest. Wolves migrating to the Forest would not be removed by the Forest Service or the WGFD, and would be allowed to persist until such time as predation concerns from the public called for their removal. Numbers of wolves are not likely to reach a level where indirect effects to habitat would result from a change in ungulate population levels potentially reduced by wolves. Although the continued grazing of livestock on the Forest would likely provide additional impetus to remove wolves causing indirect effects, the recovery goals for this species in the reintroduced population have already been met. The removal of wolves on the Forest would not likely provide additional cumulative effects than those already occurring such that a trend in wolf populations would be affected in the core recovery area as identified by the State's draft plan. Higher numbers of livestock and year-round opportunities for wolves to depredate livestock occur on all the private lands surrounding the Forest, which is where the most likely occurrences of wolf removal would occur. Based on the above rationale, and the analysis provided in the 1994 reintroduction EIS, the Forest's continued and anticipated management activities **may affect, but would not likely adversely affect** the wolf.

Grizzly Bear With regard to the grizzly bear, the State's management plan indicates that grizzly bears are not a desired species to be managed for on the Bighorn. The Bighorn is outside of the recovery area for this species. This is due to recreation and human interaction conflicts that would likely occur. Grizzly bears also thrive under less developed conditions than the Bighorns (i.e. road densities), and thus there is likely less suitable habitat here as compared to the Greater Yellowstone Ecosystem. Should any bears migrate to the Bighorn, they would likely be trapped and relocated by the WGFD according to the State plan, in consultation with the USFWS. Due to the anticipated lack of establishment of this species on the Forest, there would be **no effect** to this species from implementation of the Revised Plan.

Lynx Analysis Units and Habitat Spreadsheet

The following spreadsheet lists current habitat conditions within the LAUs. The CVU mapping criteria are described below. Differences are noted with regard to previous (2000 RIS database) mapping criteria.

Mapping Definitions:
1) Total acres in an LAU include all cover types (rock, shrub, conifer, etc.). LAU boundaries correspond to the 7,000' elevation contour as delineated in 2000 with the USFWS.
2) Potential habitat acres are all of the conifer acres within the LAU. Previous distinctions of foraging habitat (Willows > 5'; and forested structural stages on less than 40% slopes) were not tracked, as these criteria were not within the final LCAS.
3) Unsuitable Acres are totals of 1T, 2T, 3A, and 4A forested structural stages.
4) Denning habitat defined as acres of structural stage 4C. Note that 2000 mapping was 4C on NW to NE aspects (315-45 deg.) and <40% slope. Again, slopes and aspect not included as not in final LCAS.

Denning habitat would be reclassified to coincide with old growth once geographic area surveys are completed and updated in CVU (~10 yrs.).
Another caveat is that down woody debris occurs in many structural stages due to fire occurrence or harvest methods, and would need ground truthed at the project scale if an old growth inventory is not available.

Structural Stage Class Legend
1T = Previous timber stand in meadow stage
2T = Previous timber stand in seedling stage
3A = 1-9" dbh trees, 0-40% canopy
3B = 1-9" dbh trees, 40-70% canopy
3C = 1-9" dbh trees, >70% canopy
4A-C = Same as 3A-C, but >9" dbh

Bighorn NF Lynx Analysis Units (LAU) Habitat Structural Stage Conditions

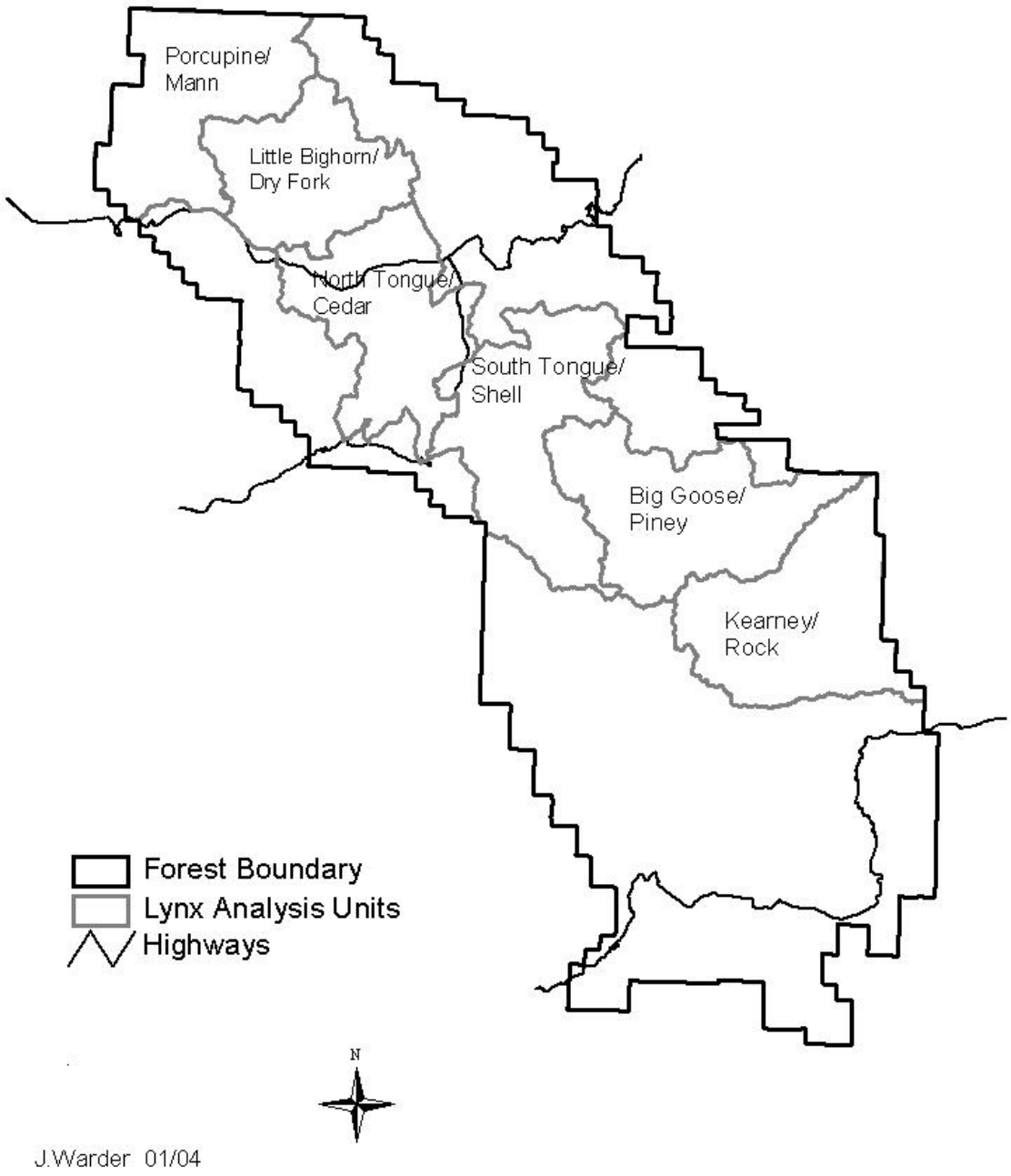
Category	Porcupine/ Mann	Little Bighorn/ Dry Fork	North Tongue/ Cedar	South Tongue/ Shell	Big Goose/ Piney	Kearney/ Rock
Total Acres in LAU	83,793	65,952	77,828	87,707	88,901	91,706
Potential Lynx Habitat Acres	48,753	41,918	39,826	55,206	68,416	66,427
Unsuitable Acres and % of Potential Lynx Habitat	5,648 (12%)	2,866 (7%)	4,132 (10%)	6,079 (11%)	7,329 (11%)	4,319 (7%)
Denning Acres and % of Potential Lynx Habitat	17,279 (35%)	14,293 (34%)	9,477 (24%)	8,571 (16%)	9,158 (13%)	12,882 (19%)

Last Update 8/11/03, calculated using CVU rather than RIS (2000 edition, as displayed in forest-wide BA consultation)

The following activities are known to have occurred or are planned and have not yet been updated in the CVU database. Not all of the activities may occur within an LAU. Tracking of these activities would include a date, acres, and structural stage conversion made. As the CVU database is currently being uploaded into R2Veg database, and since these projects (with the exception of the fires) have not been completed, updates to the database have not yet occurred.

2004 Swamp Timber Sale
2005 Woodrock Timber Sale
2004 Hunt Mt. RX burn
2003 Ditch Creek Fire
2003 Little Horn 2 and Riley Point Fires

BIGHORN NATIONAL FOREST
LYNX ANALYSIS UNITS



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/W.19/WY9640

August 2, 2005

William Bass, Forest Supervisor
Big Horn National Forest
2013 East Side, 2nd Street
Sheridan, Wyoming 82801

Dear Mr. Bass:

Thank your for your letter of July 6, 2005, received in our office on July 7, with the accompanying Final Environmental Impact Statement (FEIS) and Biological Assessment (BA) for the Bighorn National Forest (Forest), Land and Resource Management Plan (LRMP). In your letter you requested consultation with the Service regarding threatened and endangered species that could be potentially affected by this plan revision. The FEIS presents six alternatives, developed during the forest plan revision process, and their projected consequences for the management of the Forest. The U.S. Forest Service (Forest Service) has identified Alternative D as the final selected alternative for providing guidance for resource management activities on the Bighorn National Forest for the next 10 to 15 years.

Our office has reviewed the final selected Alternative D of the LRMP and its potential effects on Federally listed species, in accordance with section 7(a)(2) of the Endangered Species Act (Act) of 1973, as amended (50 CFR §402.13). This document transmits U.S. Fish and Wildlife Service (Service) concurrence based on our review of the FEIS and BA for the Bighorn National Forest revised LRMP.

Bald eagle (*Haliaeetus leucocephalus*), Canada lynx (*Lynx canadensis*), gray wolf (*Canus lupus*), grizzly bear (*Ursus arctos*), Ute ladies'- tresses (*Spiranthes diluvialus*), and pallid sturgeon (*Scaphirhynchus albus*) are the Federally listed species addressed in the Bighorn National Forest LRMP. Although Ute ladies'-tresses and pallid sturgeon do not occur in the Forest they may potentially be affected by land management actions that impact the Yellowstone River system in Montana. The Montana Ecological Service Field Office provided our office with their comments regarding these species in an electronic mail transmission dated July 29, 2005. Those comments are incorporated into this letter.

Bald eagle: No bald eagles are known to have nested during the breeding season, or communally roosted during winter in the Bighorn National Forest, currently or historically. Bald eagles have been observed foraging on the fringes of the Forest and at unfrozen, high elevation lakes, primarily during fall and spring migrations. Under the final selected Alternative D for the LRMP, there would be no anticipated forest-wide management changes that would affect

foraging habitat for bald eagles. Conservation measures to protect any bald eagle nests and/or winter roosts that may become established in the future are incorporated in the revised LRMP. Based on this information, the Service concurs with the Forest Service that the revised LRMP for the Bighorn National Forest 'may affect, but is not likely to adversely affect' the bald eagle.

Canada lynx: Canada lynx occurred historically on the Bighorn National Forest (Ruggiero *et al.* 1994). There is no evidence that lynx currently reside in the Forest. In 2002/2003 there were two sightings of lynx on the Forest, however as reported in the BA for the LRMP, these were not confirmed with track measurements or other methods. Hair snare traplines set up in selected areas of the forest in 2002/2003 failed to detect lynx. Lynx habitat was mapped on the Bighorn National Forest in 2000, and six lynx analysis units (LAUs) were identified. As reported in the BA, all six LAUs met thresholds for denning or combined lynx habitat as defined in the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger *et al.* 2000). All LAUs in the Forest continue to meet the LCAS habitat threshold levels, as documented in the BA.

Using the vegetation database to track vegetation and lynx habitat conditions, the Forest has determined that lynx denning habitat (coarse woody debris under a forested canopy) is not likely to become limiting. Due to the fact that less than 5 percent of the Forest's six LAUs are comprised of young structural states, the Bighorn National Forest has determined that there is a potential for young structural stages, particularly in spruce-fir cover, to become a limiting component of lynx habitat in the future. Young structural class forests provide habitat for hares, the primary prey for lynx. Travel corridors or linkage habitat for lynx movements on the Forest appear to be sufficient, due to the small highways (low traffic volume and narrow widths of Highways 14 and 16) that traverse the Forest, and the naturally wooded conditions throughout the Forest. Key linkage routes to potential habitat in the Greater Yellowstone Ecosystem have been identified, and include the Pryor Mountains to the northwest, and the Owl Creek mountains to the southwest. There are no highways or other barriers along these routes. The dry, shrub habitat adjoining the Forest may hinder lynx movement, although this habitat has been crossed by lynx in the past. Lynx have also been sighted in sagebrush habitats surrounding the Forest during the past few decades, presumably during dispersal movements.

The BA addresses projected impacts to lynx habitat, during the next 10 to 15 years, from recreation, livestock management, prescribed fire, wild fire, and timber harvest on the Bighorn National Forest. Although recreation is forecasted to increase, large areas of the Forest have low road densities which currently limit the ultimate scale of recreation. Only a minimal increase in the extent of winter recreational trails, such as those developed for snowmobile use is anticipated. In general, the number of snow-packed routes, that have the potential to affect lynx by, for example, enabling coyotes to access lynx habitat, are unlikely to be significantly increased. The BA documents that livestock management is expected to continue to be improved with possible reductions in some allotments where standards and guidelines of forage utilization cannot be met under existing stocking rates or grazing systems. Prescribed fires, wildfire and insect infestations will continue to alter habitat on the Forest. Although the occurrence of wildfire is not fully predictable, it is anticipated that 10,000 acres may burn in the next 10 to 15 years, and that insect infestations and disease may increase the area affected. Timber harvests will continue, and they will be analyzed using a harvest modeling process.

Timber harvest objectives in the revised Forest Plan conform to LCAS guidelines. However, in unoccupied habitat, the Bighorn National Forest may conduct thinning of forest stands, up to 10,000 acres primarily in dry site lodgepole pine, during the next planning period. As stated in the BA, this level of thinning is not expected to have a measurable impact on lynx habitat due to the lower habitat value of lodgepole pine for lynx, the forest-wide availability of lynx habitat, and the large areas of non-harvested forests. The Healthy Forest Initiative is not anticipated to increase current levels or demands for harvesting or thinning since the Bighorn National Forest has very few areas with potential urban/forest interface conditions. Overall, forested vegetation should continue to be dominated by mature stands, and young seral conditions may continue to be under-represented at a forest-wide scale.

Cumulative effects to lynx were addressed in the Forest Plan BA. In general, there are few State and private activities on the Forest. A rest area has been proposed for construction on Highway 16, and sections of Highway 14, below 7000 feet may be widened over the next several years, but it will remain a two-lane road. Both actions are outside of LAUs and are not anticipated to affect lynx habitat or movements. Traffic volume is anticipated to increase through the Forest in the next 10 to 15 years, but most traffic is recreationally based, occurs during daylight hours in the summer months, and it is not considered to be a significant injury or mortality risk to carnivores in general. Along with an increasing population in the area, private ranch lands bordering the Forest may be subdivided for development in upcoming years. Wildlife may be displaced from these areas, but they are well outside LAUs on the Forest. There are no forcasted oil and gas development on, or immediately adjacent to, the Forest.

In the BA of the LRMP, the Bighorn National Forest concludes that the value of the Forest as habitat for lynx is likely to increase in the future. The most significant past activities altering the Forest are the development of road networks for timber harvest, causing loss of lynx habitat through surface modification and allowing for influx of competing predators, such as coyotes, following the easily travelled access roads. The BA indicates that impacts from past timber harvesting has only minimally changed the vegetation on the Forest, since clearcuts mimic fire disturbances, and other harvest regimes are slow to change forest canopy structures. Additionally, due to the limited extent of logging on the Forest, the reduction in the coarse woody debris in the Forest, a habitat component important to denning lynx, is not widespread. Future projects implemented under the LMRP will use the vegetation database for tracking cumulative effects to vegetation and lynx habitat conditions. The amount of suitable and unsuitable lynx habits, by LAU, will continue to be updated on this database. As stated in the BA for the revised LRMP, if the thresholds established in the LCAS, or current management direction, are expected to be exceeded, consultaiton with the Service will be initiated. Bighorn National Forest has commited to verify or confirm any lynx sightings on the Forest, in conjunction with the Wyoming Game and Fish Department and the Service, as necessary. Additionally, general winter track monitoring for carnivores will be conducted. Based on the above information, the Service concurs with the Forest Service that the revised LRMP for the Bighorn National Forest 'may affect, but is not likely to adversely affect' the Canada lynx.

Gray wolves: The gray wolf historically inhabited the Bighorn National Forest but were extripated in the 1900's following European settlement. After reintroduction of wolves into the

Yellowstone ecosystem, individual gray wolves have been rarely sighted in or near the Forest, but no packs have been established. All wolves within Wyoming are now considered part of the nonessential experimental population. Although such wolves remain listed and protected under the Act, additional flexibility is provided for their management under the provisions of the final rule and special regulations promulgated for the nonessential experimental population on November 22, 1994 (59 FR 60252). Management flexibility is provided for managing wolves existing outside of the National Park or National Wildlife Refuge System (e.g., Forest Service lands). Wolves designated as nonessential experimental in these areas are treated as proposed rather than listed. Based on the absence of wolf packs in the Bighorn National Forest, the Service concurs with the Forest Service that the revised LRMP for the Bighorn National Forest is 'not likely to jeopardize' the gray wolf.

Grizzly Bears: Grizzly bears are not present in the Bighorn National Forest and the Forest is not within the recovery zone for grizzly bears. Based on this information, the Service concurs with the Forest Service that the revised LRMP is 'not likely to adversely affect' the grizzly bear.

Pallid Sturgeon: Pallid sturgeon did not historically inhabit the Bighorn National Forest, and the Forest is not included as a recovery area for this endangered fish species. However, if activities on the Bighorn National Forest affect the Tongue or Powder Rivers they may have potential to affect the pallid sturgeon further downstream in the Yellowstone/Missouri River system. As stated in the BA for the revised LRMP, the Forest is not proposing any water depletions (e.g., diversions or storage reservoirs) in the revised LRMP. There is minimum mining activity proposed (mostly gravel), and there will be no oil or gas leasing. The Montana Field Office of the Service reviewed the proposed timber harvesting, travel management, fire and fuels, and livestock activities and found no activities that would have downstream negative effects on the pallid sturgeon. Under the Act, the Forest Service does not require concurrence from the Service when it has been determined that a proposed action or plan will have no effect on a Federally listed species. In this case, however, the Bighorn National Forest has requested concurrence. Based on the above information, the Service concurs with the Forest Service that the revised LRMP for the Bighorn National Forest will have 'no effect' on the pallid sturgeon.

Ute ladies'-tresses: The threatened Ute ladies'-tresses inhabits wetland and riparian areas in the intermountain west. The potential for Ute ladies'-tresses habitat on the Forest was evaluated in conjunction with surveys conducted to determine its presence in 2002 and 2003 (USDA 2002, 2003). No Ute ladies'-tresses populations or habitats were found on the Forest. Based on the information from the 2002 and 2003 survey reports, and a review of the Ute ladies'-tresses habitat modeling, conducted by the Wyoming Natural Diversity Database in 2003, the Service agreed with the Bighorn National Forest that there is no habitat for Ute ladies'-tresses on the Forest. Ute ladies'-tresses has been removed from the Service's list of threatened, endangered and proposed species for the Bighorn National Forest.

No impacts to downstream populations of Ute ladies'-tresses in the Powder/Tongue/Yellowstone River system are anticipated since there are no new depletions to these rivers in the revised plan. Additionally, minimum mining activity is proposed (mostly gravel), and there is no oil or gas leasing in the revised plan. The Montana Field Office of the Service reviewed the proposed

timber harvesting, travel management, fire and fuels, and livestock activities and found no activities that would have negative effects on Ute ladies'-tresses downstream of the Bighorn National Forest. Under the Act, the Forest Service does not require concurrence from the Service when it has been determined that a proposed action or plan will have no effect on a Federally listed species. In this case, however, the Bighorn National Forest has requested concurrence. Based on the above information, the Service concurs with the Forest Service that the revised LRMP for the Bighorn National Forest will have 'no effect' on Ute ladies'-tresses.

We appreciate the continued efforts of the Bighorn National Forest to ensure the conservation of Federally listed species. If you have any questions or comments regarding this letter, please contact Trish Sweanor at the letterhead address or phone (307) 772-2374, extension 39.

Sincerely,

/s/ Jodi Bush *for*

Brian T. Kelly
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Wyoming State Office

cc: USFWS, Montana Ecological Services, Helena, MT (M. Wilson)
USFWS, Montana Ecological Services, Billings, MT (L. Hanebury)
WGFD, Lander, Non-Game Coordinator (B. Oakleaf)
WGFD, Cheyenne, Statewide Habitat Protection Coordinator (V. Stelter)

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USDA, 2002. Letter dated December 9 from Forest Supervisor to Wyoming Ecological Services Field Office and report on the potential habitat and surveys conducted for Ute ladies'-tresses on the Bighorn National Forest.

USDA, 2003. Letter dated September 8 from Forest Supervisor to Wyoming Ecological Services Field Office reporting results of efforts to locate Ute ladies'-tresses on the Bighorn National Forest.